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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/605,609

10/13/2003

Andrew M. Hoff

1372.80.PRC

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12/07/2004

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EXAMINER

DANG, PHUC T

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 12/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/605,609

Applicant(s)

HOFF, ANDREW M.

Examiner

PHUC T DANG

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 is/are allowed.
- 6) ☒ Claim(s) 1 and 4-9 is/are rejected.
- 7) ☒ Claim(s) 2 and 3 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

1. This application claims benefit of 60/319,607 filed on October 11, 2002.

Oath/Declaration

2. The oath/declaration filed on October 13, 2003 is acceptable.

Specification

3. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Drawings

4. The drawings are objected to as failing to comply with 37 CFR.1.84(p)(5) because they include the following reference sign(s) not mentioned the description: reference [1]-[9] in Figs. 1-2. Correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 5-6, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rupp et al., hereinafter "Rupp" (U.S. Patent No. 6,299,683 B1) in view of Ioku et al., hereinafter "Ioku" (U.S. Patent No. 4,582,561).

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Regarding claims 1, 5-6 and 9, Rupp discloses a method of forming thin silicon oxide film comprising the steps of:

providing a silicon carbide substrate;

passing an oxidizing gas; and

contacting the substrate with the excited gas [col. 6, lines 34-47].

Rupp discloses the features of the claimed invention as discussed above, but does not disclose providing a silicon carbide substrate within a tube, forming an oxidizing gas passing through an oscillating radio frequency electric field, wherein the gas achieves an excited state of energy and the tube is maintained at a temperature range between 600°C to 1,200°C and at a pressure less than 50 torr.

Ioku, however, discloses a step of forming an oxidizing gas passing through an oscillating radio frequency electric field, wherein the gas achieves an excited state of energy [col. 11, lines 65-col. 12, lines 7].

It would have been obvious to one having ordinary skilled in the art at the time the invention was made to apply the teaching of Ioku to Rupp discussed above such that a step of providing a silicon carbide substrate within a tube and forming an oxidizing gas passing through an oscillating radio frequency electric field, wherein the gas achieves an excited state of energy for a purpose of improving a process of forming an oxide film on silicon carbide semiconductor.

6. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rupp and Ioku in view of Su et al., hereinafter "Su" (U.S. Patent No. 5,507,874).

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Regarding claims 7-8, Rupp and Ioku disclose the features of the claimed invention as discussed above, but does not disclose the silicon substrate is secured onto a heated zone and the pressure is maintained using a vacuum pump.

Su, however, discloses the silicon substrate is secured onto a heated zone and the pressure is maintained using a vacuum pump [col. 6, lines 5-10].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the teaching of Su to Rupp and Ioku discussed above such that the silicon substrate is secured onto a heated zone and the pressure is maintained using a vacuum pump for a purpose of improving a process of forming an oxide film on silicon carbide semiconductor.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rupp and Ioku in view of Marcus et al., hereinafter "Marcus" (U.S. Patent No. 6,077,751).

Rupp and Su disclose the features of the claimed invention as discussed above, but does not disclose the oxidizing gas is selected from the group consisting of molecular oxygen, atomic oxygen, excited molecular O₂ (singlet delta g state), and nitrogen oxides.

Marcus, however, discloses the oxidizing gas is selected from the group consisting of molecular oxygen, atomic oxygen, excited molecular O₂ (singlet delta g state), and nitrogen oxides [col. 6, lines 18-21].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the teaching of Marcus to Rupp and Ioku discussed above such that the oxidizing gas is selected from the group consisting of molecular oxygen, atomic oxygen, excited

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molecular O₂ (singlet delta g state), and nitrogen oxides for a purpose of improving a process of forming an oxide film on silicon carbide semiconductor.

Allowable Subject Matter

8. Claim 10 would be allowed.

The following is a statement of reason for the indication of allowable subject matter:

Claim 10 is considered allowable since the prior art of record and the considered pertinent to the applicant's disclosure does not teach or suggest the claimed invention having a step of passing an oxidizing gas through an afterglow plasma source, wherein the gas achieves an excited state of energy.

Claims 2-3 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

None of the Prior Art of record discloses the electric field is created by using an afterglow thermal reactor as cited in claim 2 and using a microwave cavity as cited in claim 3.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuc T. Dang whose telephone number is (571) 272-1776. The examiner can normally be reached on 8:00 am-5:00 pm.

10. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone numbers for the organization

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where this application or proceeding is assigned are 703-872-9306 for regular communications and After Final communications.

11. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Phuc T. Dang

PD

A handwritten signature in cursive script, appearing to read 'Phuc T. Dang', with a long, sweeping horizontal line extending to the right.

Primary Examiner

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